

Claims

1. Method for controlling system parameters, in particular for controlling the voltage applied to piezoelectric elements (10, 20, 30, 40, 50, 60) within a circuit (A) for charging and discharging piezoelectric elements (10, 20, 30, 40, 50, 60), characterized by modifying at least one control parameter for the control of a system parameter, in particular a target voltage for the voltage applied to a piezoelectric element (10, 20, 30, 40, 50, 60), in view of at least one systematic error occurring during a first control procedure of the system parameter to obtain a corrected control parameter for a second and/or a further control of the system parameter.
2. The method of claim 1, characterized in that
 - a) a system parameter, in particular the voltage across a piezoelectric element (10, 20, 30, 40, 50 or 60), is modified according to a predefined target value, in particular a target voltage (U_{target});
 - b) the resulting value of the system parameter is measured by measuring means (600, 610; D, E);
 - c) the measured value is compared to the predefined target value by comparison means (D, E); and
 - d) a target value for a further modification of the system parameter is modified in consideration of detected differences between the measured value and the first predefined target value.
3. Method as according to one of the foregoing claims, characterized in that
 - a1) the system parameter is modified in accordance with at least one control parameter corresponding to a target value;

- a2) the modification of the system parameter is performed in a plurality of discrete steps;
- a3) the modification procedure is controlled by means of measuring and comparing any obtained value of the system parameter to the target value by measuring means and comparison means, respectively;
- a4) the modification procedure is terminated as soon as the obtained value equals the target value by terminating means (E);
- b) the obtained value of the system parameter is re-measured after the modification procedure is terminated by measuring means (D, E; 600, 610); and
- c) the re-measured value of the system parameter is compared as resulting system parameter to the target value by comparison means (D, E).

4. Method as according to one of the foregoing claims, characterized in that detected differences between the measured value and the target value are taken into consideration by means of adding an offset to any desired target value for a further modification procedure.

5. Method as according to one of the foregoing claims, characterized in that the offset is calculated as the absolute or relative difference between the first target value and the corresponding obtained value as measured.

6. Method as according to one of the foregoing claims, characterized in that the offset is a function of an averaged and filtered measured voltage ($\langle U_{\text{actual}} \rangle$) of piezoelectric elements (10, 20, 30, 40, 50, 60) and an averaged and filtered target voltage ($\langle U_{\text{target}} \rangle, \langle U_{\text{offset}, p} \rangle$) for said piezoelectric elements (10, 20, 30, 40, 50, 60).

7. Method as according to one of the foregoing claims, characterized in that the averaged and filtered target voltage ($\langle U_{\text{target}} \rangle$, $\langle U_{\text{offset},p} \rangle$) of piezoelectric elements (10, 20, 30, 40, 50, 60) is a function of an averaged and filtered voltage offset value ($\langle U_{\text{offset},p} \rangle$) and an averaged and filtered initial target voltage ($\langle U_{\text{target}} \rangle$) for the piezoelectric elements (10, 20, 30, 40, 50, 60).
8. Method as according to one of the foregoing claims, characterized in that an offset is determined for each of top-closed position, up-open position and down-open position of the piezoelectric elements (10, 20, 30, 40, 50 and 60).
9. Method as according to one of the foregoing claims, characterized in that an offset is stored as long as a corresponding position of the piezoelectric elements (10, 20, 30, 40, 50 and 60) is not used.
10. Apparatus, in particular eligible for usage with a method as according to one of the foregoing claims, characterized in that
 - a) modification means (A, E, D) for the modification of system parameters according to at least one control parameter;
 - b) measuring means (E, D; 600, 610) for the measurement of the value of the resulting system parameter;
 - c) comparison means (E, D) for the comparison of the measured value to a predefined target value; and
 - d) calculation means (D) for the calculation of at least one control parameter for a further modification of the system parameter in accordance with differences occurring between the measured value and the target value are implemented within the apparatus.